PATENT ABSTRACTS OF JAPAN

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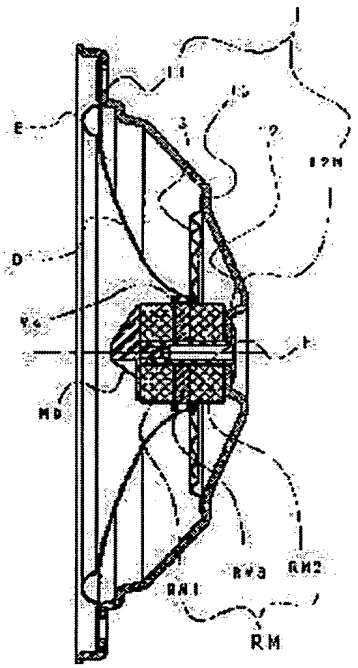
(54) SPEAKER STRUCTURE

(57)Abstract:
PROBLEM TO BE SOLVED: To make this speaker small-sized by making a cross-section from an inner peripheral part of a damper seat that is a damper adhering tab part of a speaker frame to an outer peripheral part of a lower part of a magnetic circuit a linearly connected shape.
SOLUTION: The cross-section of a frame bottom part 12 that is lower than a damper seat 13 is molded in a W shape so that resonance of the part 12 on which a neodymium repulsion type magnetic circuit RM is mounted may be basically a little and also that molding may be easy to be performed. A central part of the part 12 rises in a projecting shape, a summit part of a projecting part 12M has a flat end part having an optional diameter and the circuit RM is mounted on the flat end part. By being such a frame shape, curved surface where resonance is hard to occur is configured between an inner peripheral part of the seat 13 and the neodymium repulsion type magnetic circuit mounted part 12M. The shape of a frame 1 adapts to the shape of the circuit RM whose outer diameter dimension is small so as to get a speaker that has the circuit RM which is hard to resonate.



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CLAIMS

[Claim(s)]
[Claim 1] On both sides of the pin center,large plate (RM3) which consists of magnetic material, two magnets (RM1) (RM2) are arranged so that a like-pole comrade may counter. In the repulsion type magnetic-circuit mold loudspeaker which comes to arrange a voice coil in this repulsion type field while the repulsion type magnetic circuit (RM) which forms a repulsion type field in the periphery of this pin center,large plate (RM3) is constituted Loudspeaker structure characterized by considering as the configuration where even the periphery section of the inner circumference section to the magnetic-circuit soffit section of the damper seat (13) which is the damper **** cost section of a loudspeaker frame (1) was connected in the shape of a straight line in the cross section.
[Claim 2] On both sides of the pin center,large plate (RM3) which consists of magnetic material, two magnets (RM1) (RM2) are arranged so that a like-pole comrade may counter. In the repulsion type magnetic-circuit mold loudspeaker which comes to arrange a voice coil in this repulsion type field while the repulsion type magnetic circuit (RM) which forms a repulsion type field in the periphery of this pin center,large plate (RM3) is constituted Heap up the part which attaches the repulsion type magnetic circuit of a frame pars basilaris ossis occipitalis (12), and heights (12M) are prepared. Loudspeaker structure according to claim 1 characterized [in / for from the inner circumference side of a damper seat (13) to the soffit section of said heights (12M) / a cross section] by making the cross section of an epilogue and this frame pars basilaris ossis occipitalis (12) into a W character configuration at the shape of a straight line.
[Claim 3] Claim 1 characterized by coming to prepare the rib (12L) of arbitration inside the damper seat (13) of a frame (1), or structure of the loudspeaker of two publications.
[Claim 4] A flange (H1) is prepared in the edge of the magnet holder (H) of the shape of a rod which supports said repulsion type magnetic circuit (RM). The rear-face side of a frame pars basilaris ossis occipitalis (12) or said heights (12M) is equipped with this flange (H1). Structure of the loudspeaker according to claim 1 to 3 characterized by coming to pinch the pars basilaris ossis occipitalis (12) or said heights (12M) of a frame 1 with the magnet (RM2) of this flange (H1) and said repulsion type magnetic circuit (RM).

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to loudspeaker structure and relates to the structure of the repulsion type magnetic-circuit mold loudspeaker especially aiming at lightweight-izing.
[0002]
[Description of the Prior Art] In the latest loudspeaker, especially latest loudspeaker for mount, lightweight-ization is demanded strongly. The frame and the magnetic-circuit section of a loudspeaker component part occupy most weight not only in the loudspeaker for mount but a general loudspeaker. For example, when the example of the loudspeaker which we provide with the loudspeaker weight of the 6.5 inch aperture currently most used abundantly as a loudspeaker for mount explains, the weight of a loudspeaker simple substance is about 630g, and, for a frame, 138g and the magnetic-circuit section are [about 483g, 3.2g of vibration system components, and others of the breakdown of each component part] 5.8g.
[0003] It stands to reason that lightweight-izing of the magnetic-circuit section which occupies about 77% of the weight of a loudspeaker simple substance like drawing 14 is the most effective when attaining lightweight-ization of the above loudspeakers. In the case where the magnetic engine performance uses the repulsion type magnetic circuit RM using a neodymium magnet (RM1, RM2) like drawing 13 higher than the ferrite magnet M1 for whether your being Haruka Since a magnetic circuit is lightweight-ized substantially, it ends with reinforcement with few [far] frames supporting this magnetic circuit than the frame supporting the magnetic circuit using the conventional ferrite magnet.
[0004] That is, by attaining lightweight-ization of a magnetic circuit M, a leeway is given about the reinforcement of a frame 1, and it becomes possible to reduce frame weight further, and is very effective for lightweight-izing. We offer the practical loudspeaker with a simple substance weight of 130g or less by the loudspeaker of 6.5 inch aperture using the aluminum frame 1 with a weight of 40g which comes to carry out press working of sheet metal of the aluminum plate which are the neodymium repulsion type magnetic circuit RM whose weight is 65g, and 0.7mm.
[0005] It is coming by the frame made of the metal frame for which the weight of a frame is used now, widely, and generally although it is just going to be expected for lightweight-ization of a frame to be too attained in lightweight-ization of a magnetic circuit M as main means in current lightweight-izing, for high performance-ization to continue to progress, and, as for the neodymium magnet M1, for the further miniaturization to be more possible than the actual condition, and to contribute to lightweight-ization, or resin till the place already near a limitation.
[0006] That is, the present frame, especially the frame of the loudspeaker for mount have the rational gestalt by thorough pursuit of cost, a function, etc., when lightweight-ization of the frame more than now is performed by technique, such as thinning of a frame, run short of frame reinforcement extremely, and have a possibility that frame resonance may stop making the body of a frame, generating simply and deforming at the time of vehicle indoor wearing.
[0007] For example, in the case of the aluminum frame 1, by activity within the limits usually used generally also with the aluminum frame 1 (about 40g) of 0.7mm of board thickness, tone-quality degradation by frame resonance did not appear notably, and the need reinforcement as a frame 1 is secured. However, since reinforcement is about about 1 / 2 as compared with the griddle frame 1 of 0.7mm of these board thickness, in case the aluminum frame 1 of 0.7mm of these board thickness attaches the loudspeaker of this aluminum frame 1 in the vehicle interior of a room, the danger of making it deforming near this loudspeaker the anchoring flange 11, especially near the anchoring screw hole in a screw bundle activity is high [the frame].
[0008] Therefore, the actual condition has prevented screw bundle deformation of a flange by increasing the board thickness of a frame 1 from 0.7mm to 1mm. That is, the reinforcement of a flange is reinforced by raising the whole frame 1 reinforcement, frame 1 weight also increases with a natural thing, and it has frame weight of about 60g from about 40g.
[0009] Considering giving top priority to lightweight-ization, if the frame flange 11 of 0.7mm (40g) of board thickness of a frame 1 does not deform, it is good one, for example, the rear face of a mounting flange is equipped with the spacer which consists of the shape of a ring, such as resin with the thickness of arbitration, or metal, with means, such as adhesion, and it is possible to reinforce a flange 11.
[0010] However, since it will become the same as the weight (60g) which set board thickness of a frame 1 to 1mm from 0.7mm and the effectiveness of lightweight-izing will fade if the weight of this SU **-SA is set to 20g or more, construction material with the reinforcement which it is moreover lightweight by the indispensable condition that SU **-SA weight is 20g or less as much as possible, and can moreover bear the screw bundle force will be required. Thus, various kinds of countermeasures are needed to deformation of a flange 11.
[0011] The construction material which increases frame 1 reinforcement to prevent resonance of a frame 1 on the other hand, or cannot resonate easily is chosen, and there is only the approach of producing a frame 1. That is, it is fully thick in the reinforcement which the main factor of frame 1 resonance originates in the repulsion actuation by the magnetic circuit M, and can be equal to this repulsion actuation, for example, frame 1 thickness, or although the response approach of arranging a stiffening rib appropriately is common, the approach of preventing resonance serves as an inclination which gains in weight.
[0012] However, the present neodymium repulsion type magnetic circuit RM is what was attached in the frame 1 for outside ** type magnetic-circuit M which used the conventional ferrite magnet as shown in drawing 15 . Although it is hard to generate resonance of a frame 1 when this frame 1 is equipped with the ** type magnetic circuit M outside a ferrite When equipped with the neodymium repulsion type magnetic circuit RM, it became clear that it became easy to generate resonance of a frame 1, and frame 1 resonance originated in the flat configuration of the magnetic-circuit applied part in the frame pars basilaris ossis occipitalis 12.
[0013] Although the frame 1 is hereafter equipped as a neodymium repulsion type magnetic-circuit RM mounting arrangement through the holder H attached in the frame pars basilaris ossis occipitalis 12 as shown in drawing 11 if a detail is explained By the case where caulking wearing of the holder H is carried out when the case where it does not generate with the case where frame 1 resonance occurs is found out by the holder H wearing condition to the same frame 1 and resonance occurs according to it, when resonance did not occur and screw stop wearing of the holder H was carried out, it came out, and a certain thing became clear.
[0014] Said holder H is a product made from aluminum, and the pole H2 section for a guide with a thickness of about about 1-2mm which is the neodymium repulsion type magnetic circuit RM is prepared in general in the center of the disc configuration pars basilaris ossis occipitalis H1 by one in the cross-section configuration as shown in drawing 11 or drawing 12 . In drawing 11 , if the example of caulking wearing is described, hole 12H prepared in the center of the pars basilaris ossis occipitalis 12 of said 40g aluminum frame 1 (0.7mm of board thickness) like drawing 15 will be equipped with Holder H, but as shown in drawing 11 , the heights H4 of the shape of the predetermined location of 1.5mm of the top face of

the flange H1 of a holder pars basilaris ossis occipitalis, i.e., the height which can be inserted in said hole 12H, and a ring like width-of-face 1mm are formed in said holder H.
[0015] As the periphery section of these ring-like heights H4 is inserted in the hole 12H inner circumference section and it is further shown in the local enlarged drawing of drawing 11 , press deformation of the location which looked at and divided these ring-like heights H4 into 16 from the upper part was carried out by width of face of about 1mm, hole 12H are equipped with these heights H4, and the frame 1 is equipped with Holder H by caulking ******. It equips with the voice coil Vc which are vibration system components, Diaphragm Df, Damper S, the neodymium repulsion type magnetic circuit RM, etc., and is made to complete as a loudspeaker after wearing.
[0016] In drawing 12 , if the example of screw stop wearing of Holder H is described Although it equips with Holder H with Screw b through 12h (refer to drawing 15) of holes for the ** type magnetic-circuit M installation outside a ferrite established in said hole 12H prepared in the pars basilaris ossis occipitalis 12 of said 40g aluminum frame 1 (0.7mm of board thickness) four places by distribution 90 degrees The flange H1 which becomes the outside of the ring-like heights H4 of said holder H for caulking wearing from about 3mm in thickness is formed in Holder H, and the female screw section is further prepared in the location corresponding to 12h of said magnetic-circuit M installation holes.
[0017] In the case of such a screw stop, said ring-like heights H4 serve as a location ****** guide with this holder H and a frame 1, and insert the periphery section of these heights H4 in the hole 12H inner circumference section. Furthermore, the female screw hole of a flange H1 is doubled with 12h of holes for magnetic-circuit M installation of a frame 1. Conclude four places with Screw b, a frame 1 is made to equip with Holder H, and it equips with the voice coil Vc which are vibration system components, Diaphragm Df, Damper S, the neodymium repulsion type magnetic circuit RM, etc. after wearing, and is made to complete as a loudspeaker.
[0018] The outer diameter of the neodymium repulsion type magnetic circuit RM is a minor diameter farther than the ** type magnetic circuit M outside a ferrite. since [therefore,] it ends with a path smaller than the conventional path of hole 12H in case the neodymium repulsion type magnetic circuit RM is arranged at the frame pars basilaris ossis occipitalis 12 -- consequent -- the periphery section of the frame pars basilaris ossis occipitalis 12 -- between the periphery sections of the neodymium repulsion type magnetic circuit RM -- flat part 12F -- generating -- this -- it had become the structure which is easy to resonate since flat part 12F will be excited in this magnetic circuit M. When two cases of the caulking wearing structure of causing frame resonance, and the screw stop structure where frame resonance is not caused are compared, caulking wearing structure is near structure by said resonance generating structure.
[0019] Since it becomes the frame pars basilaris ossis occipitalis 12, i.e., the configuration which reinforces flat part 12F, since the thick dimension of the flange H1 which prepared the female screw hole is large in the case of screw stop structure, and reinforcement increases substantially, it becomes the structure of being hard to generate resonance.
[0020] Frame resonance is not generated even if it incidentally impresses an input signal to the loudspeaker which equipped said 40g aluminum frame 1 with the conventional ** type magnetic circuit M outside a ferrite (weight of 480g), as shown in drawing 14 . Moreover, when said holder H was not formed in the frame pars basilaris ossis occipitalis 12 as shown in drawing 13 , but the direct neodymium repulsion type magnetic circuit RM was established in the frame 1 in the condition that there are no hole 12H that is, it checked that frame resonance occurred similarly in the condition that flat part 12F dimension between the periphery sections of the neodymium repulsion type magnetic circuit RM is larger than the periphery section of the frame pars basilaris ossis occipitalis 12.
[0021] Therefore, the frame 1 by which the current activity is carried out is the configuration of having been suitable for the ** type magnetic circuit M outside a ferrite. Using a small highly efficient magnetic circuit like the neodymium repulsion type magnetic circuit RM, increase the thickness of flat part 12F in the frame pars basilaris ossis occipitalis 12. That is, it had to consider as the structure of the increment in weight, and the effectiveness of the neodymium repulsion type magnetic circuit RM aiming at lightweight-izing was not acquired, but it became clear that it was not the configuration where it was suitable also for lightweight-ization of a frame 1 at the list.
[0022]
[Problem(s) to be Solved by the Invention] this invention -- the fault of the above-mentioned conventional example -- canceling -- small [like the neodymium repulsion type magnetic circuit RM] -- even if it equips with a highly efficient magnetic circuit -- resonating -- hard -- in addition -- and the frame 1 of the configuration of having been suitable for lightweight-ization, and the wearing structure of the neodymium repulsion type magnetic circuit RM of having been suitable for this frame 1 configuration are offered.
[0023]
[Means for Solving the Problem] Flat part 12F which exist in the frame pars basilaris ossis occipitalis 12 from the inner circumference side of the damper seat 13 like [in order to solve the above-mentioned technical problem] the frame 1 of the configuration which attaches the conventional ** type magnetic circuit M outside a ferrite are lost. Near [from the inside / seat / 13 / said / damper / to] the periphery of the magnetic-circuit M soffit section Consider as the configuration aslant connected mostly in the shape of a straight line, and the part which attaches the repulsion type magnetic circuit RM of the frame pars basilaris ossis occipitalis 12 is heaped up if needed. The convex configuration of arbitration is established and the cross section of an epilogue and this frame pars basilaris ossis occipitalis 12 was made [in / for said from the inside / seat / 13 / damper / to soffit section of heights 12M / the cross section] straight line-like at the W character configuration.
[0024] Moreover, when frame 1 reinforcement in the underside section of Damper S is still more nearly required And are stabilized, and in order to make it improve, a flange H1 is formed in the edge of Holder H. the structure of establishing rib 12L structure inside the damper seat 13 -- carrying out -- further -- the reinforcement of the applied part of a magnet M1 -- lightweight -- in addition -- Said rear-face [of the frame pars basilaris ossis occipitalis 12] or rear-face side of heights 12M was equipped with this flange H1, and it considered as the structure which pinches the applied part of a frame 1 at this flange H1 and the pars basilaris ossis occipitalis of the bottom magnet RM 2 of said neodymium repulsion type magnetic circuit RM.
[0025]
[Embodiment of the Invention] Although drawing 1 - drawing 10 explain the example of the loudspeaker structure of this invention, the conventional example and the intersection have attached the sign similarly. in order to obtain the frame 1 for loudspeakers of this invention -- this example -- setting -- the shaping metal mold of the general metal frame 1 -- cheap -- in addition -- and although it decided to produce the frame 1 made from reinforced plastics (for it to be hereafter described as CFRP.) by the carbon fiber which becomes still more nearly lightweight than the metal frame 1, the configuration and structure of this example are possible at application also on the frame 1 made from the metal frame 1, for example, aluminum, aiming at lightweight-izing, and titanium **.
[0026] The carbon textile fabrics with which the carbon fiber of a flat condition was carried out by 3000 filament numbers, and warp and the woof carried out the plain weave of the placing number per inch by 13 as a raw material of the frame of this example were obtained, the coat of the vinyl ester resin of the weight which is equivalent to these carbon textile fabrics at about 40% of the weight of these textile fabrics was carried out further, and the carbon textile fabrics CF in the prepreg condition that this resin is generally called B stage were obtained.
[0027] What piled up these three textile fabrics CF was molded by heating under pressure with the press metal mold D1 and D2, and the mold goods CFC made from CFRP as shown in drawing 2 and drawing 3 were obtained. When the process condition was described, the shaping die temperature was 140 degrees C, the press pressure was set into 15t (brake horsepower), and cycle time was set as for 3 minutes. Furthermore, the excessive part was extracted by un-fabricating in the periphery section of the flange 11 of these mold goods CFC, it excised with a press etc., and the frame 1 made from CFRP only for repulsion type magnetic-circuit RM wearing as shown in drawing 4 was produced.
[0028] When drawing 1 explains the configuration and outline dimensions of this frame 1, the diameter of the maximum dimension is 160mm outside the flange 11 for anchoring. This flange 11 is an applied part of the diaphragm edge E, an inside diameter is 127.9mm, and the about 5.8mm standup section is prepared in the periphery section of this flange. The maximum depth dimension from that of this standup section is 41.4mm, and has formed the damper seat 13 with a width of face of 5.9mm in the location with a depth of 22.8mm for the outside diameter of

85.2mm from flange 11 rear face.
[0029] It considers as an epilogue and the configuration which heaped up the center section of a pars basilaris ossis occipitalis to convex about 4mm upward further in a straight line to the location of a 9.2mm slanting lower part in 21.7mm and the depth direction more nearly further than the inner circumference section of this damper seat 13 toward the inside, and, as for the intersection of each straight line, the cross section of the downward frame pars basilaris ossis occipitalis 12 has become a W character configuration from the epilogue and damper seat 13 in general with the curve with a radius of 0.2mm - 2.4mm.
[0030] resonance of the frame pars basilaris ossis occipitalis 12 equipped with the neodymium repulsion type magnetic circuit RM by fabricating in said cross-section configuration -- fundamental -- few configurations -- becoming -- in addition -- and it becomes easy to perform shaping. Furthermore, since the frame stanchion section is constituted in the flange 11 of these mold goods between the hole for this frame 1 anchoring, and a flange 11 and the damper seat 13 as shown in drawing 4 , the frame 1 for loudspeakers is completed through the trimming process which extracts an excessive part and is excised with a press. The completion weight of this CFRP frame 1 was about 32.3g.
[0031] since it is the configuration which the center section of the frame pars basilaris ossis occipitalis 12 enlivened to convex like the above -- this -- the crowning of heights 12M has obtained the flat part with the path of arbitration, and this flat part is a neodymium repulsion type magnetic-circuit RM applied part. the case of this example -- said trimming process -- setting -- the core of this flat part -- the object for wearing of the holder H with a diameter of 6mm -- hole 12Mh -- preparing -- **** -- further -- this -- it has equipped with the holder H as shown in hole 12Mh at drawing 1 etc. The pole sections H2 made from aluminum are the outer diameter of 5.98mm, the bore of 3.6mm, and a pipe configuration with a die length of 21.5mm, Holder H formed the flange H1 with an outer diameter [of 15mm], and a thickness of 1mm in one edge of this pipe, and the other-end section has formed the female screw H3 of 5mm of effective screw sections of 3mm of diameters.
[0032] The wearing approach of said holder H in this example applies acrylic adhesives to a flange 11. It inserts from the rear-face side of hole 12Mh. furthermore, the pole section H2 of this holder H -- the object for wearing of said holder H -- in addition -- and although this flange 11 was stuck to the rear-face side of magnetic-circuit applied part 12M by pressure, it maintained until adhesives hardened this sticking-by-pressure condition and it demonstrated predetermined reinforcement, and the flange H1 section of Holder H was pasted up on the rear-face side of magnetic-circuit applied part 12M, in this example, it carried out as follows.
[0033] When drawing 5 thru/or drawing 7 explain, by the product made from brass hereafter The bore of 6mm, the outer diameter of 25.38mm, if it binds tight with Screw b since the female screw H3 is formed in the holder H crowning like the above after the configuration where the hole was prepared carrying out voice coil location appearance to a cylinder with a die length of 21mm and inserting Fixture J in the holder pole section H2 the pars basilaris ossis occipitalis of Fixture J, and the flange H1 section of Holder H -- magnetic-circuit applied part 12M of a frame 1 -- pinching -- in addition -- and magnetic-circuit applied part 12M make it the holder flange H1 page which applied adhesives stuck to a rear face by pressure very powerfully
[0034] Furthermore, although it is in the condition which equipped magnetic-circuit applied part 12M with Fixture J with Holder H as shown in drawing 6 , and it equips with vibration system components, such as a voice coil Vc, Damper S, and Diaphragm Df, the wearing approach is the same as that of the conventional general loudspeaker, and is based on adhesion. the screw b concluded in the holder H crowning as shown in drawing 7 when the adhesives used at the time of wearing reached expected reinforcement -- removing -- said, if voice coil location appearance is carried out and a fixture is sampled from Holder H Since adhesion immobilization of vibration system components and the holder flange H1 section is carried out on the basis of the voice coil Vc bore, it reaches with the outer diameter of the holder pole section H2, and the bore of a voice coil Vc will be in the wearing condition holding a position.
[0035] Furthermore, although the voice coil Vc which are Holder H and the vibration system components of this condition, Diaphragm Df, and the frame 1 with damper S are equipped with the neodymium repulsion type magnetic circuit RM The neodymium magnets [RM / RM and / 2] 1 used for this example are 8mm in the outer diameter of 25mm, the bore of 6.1mm, and thickness. The pin center,large plate RM 3 which the like poles of these magnets [RM / RM and / 2] 1 are opposed, and is pinched has performed zinc galvanizing processing by the product made of soft iron with the outer diameter of 25mm, a bore [of 6.02mm], and a thickness of 4mm, and the completion weight of this neodymium repulsion type magnetic circuit RM is about 69.4g.
[0036] If the bore section of the above-mentioned neodymium repulsion type magnetic circuit RM is inserted in the holder pole section H2 of the voice coil Vc which are said holder H and vibration system components, Diaphragm Df, and the frame 1 with damper S as shown in drawing 7 , predetermined path clearance will be set as the outer diameter of the center plate RM 3 of this magnetic circuit RM, and the bore of a voice coil Vc, and this neodymium repulsion type magnetic circuit RM will be installed. if the magnetic-circuit fixed screw Mb is attached and bolted after installation of this magnetic circuit RM to the female screw H3 formed in the holder pole H2 as further shown in drawing 7 -- the pars basilaris ossis occipitalis of the bottom magnet RM 2 of this neodymium repulsion type magnetic circuit RM, and the flange H1 section of Holder H -- magnetic-circuit applied part 12M of a frame 1 -- very -- powerful -- pinching -- in addition -- and this neodymium repulsion type magnetic circuit RM is made to fix, and it completes as a loudspeaker.
[0037] The completion weight of this loudspeaker was about 122g, when frequency characteristics were measured, the conventional loudspeaker and the property more than an EQC were shown, and the trouble resulting from a frame 1, especially troubles, such as tone-quality degradation by resonance, were not able to be found out. Furthermore, the reinforcement of the mounting flange of this loudspeaker is also enough, and most deformation by the screw b bundle was not accepted in various wearing experiments, but it checked that there was completely nothing a problem in the practical use range.
[0038]
[Example] In the case of this example, like the above, heaped up the center section of the frame pars basilaris ossis occipitalis 12 to convex about 4mm, and the cross section of the frame pars basilaris ossis occipitalis 12 carried out the W character configuration in general in order to fulfill a loudspeaker specification, but when the specifications of a loudspeaker differ (for example, when there may be little amplitude of a diaphragm) Even if it makes lightweight-ization into a sacrifice a little, to increase the reinforcement of a magnetic-circuit M applied part You may become the configuration which does not prepare drawing 9 and heights like drawing 10 , and since reinforcement is increased further, rib 12L like drawing 8 can also really be prepared by molding in from the damper seat 13 inner-circumference section before a magnetic-circuit pars basilaris ossis occipitalis.
[0039]
[Effect of the Invention] By making it a frame configuration like this invention, between neodymium repulsion type magnetic-circuit applied part 12M will be constituted from a curved surface which cannot resonate easily, and it becomes possible from the damper seat 13 inner-circumference section to almost lose flat part 12F which are easy to resonate like the conventional frame pars basilaris ossis occipitalis 12. therefore, the configuration of the neodymium repulsion type magnetic circuit RM where an outer-diameter dimension has the small configuration of a frame 1 -- suiting -- lightweight -- in addition -- and it became possible to obtain a loudspeaker with the neodymium repulsion type magnetic circuit RM which cannot resonate easily.
[0040] Moreover, it has the effectiveness that the moldability of a frame 1 is improved in the better direction, and its productivity improves since this frame 1 configuration does not have the fall section from the damper seat 13 inner-circumference section like the conventional frame 1 in a 13 or less damper seat configuration and has the loose dip configuration.
[0041] Furthermore, since frame 1 structure of preparing rib 12L structure in the impossible underside section of Damper S with the frame 1 which has the conventional ** type magnetic circuit M outside a ferrite is possible, improvement in frame 1 further reinforcement is able to measure easily.
[0042] Moreover, prepare the flange H1 section in the edge of Holder H, and the rear-face side of the frame pars basilaris ossis occipitalis 12 is

equipped with this flange H1 section. By having considered as the structure which pinches magnetic-circuit applied part 12M of a frame 1 at this flange H1 section and the pars basilaris ossis occipitalis of the bottom magnet RM 2 of the neodymium repulsion type magnetic circuit RM Like the conventionally general means of attachment of the repulsion type magnetic circuit RM as shown in drawing 13 It has the advantage from which burring for preparing the female screw section in the frame 1 made from a sheet metal etc. becomes unnecessary, and the repulsion type magnetic-circuit wearing RM of it is moreover attained easily at the frame made from CFRP in which burring is impossible.
[0043] moreover, the thing for which magnetic-circuit applied part 12M are pinched in a flange -- this -- since the substantial board thickness in applied part 12M increases -- this -- the reinforcement which is applied part 12M is made to improve substantially, and it becomes possible to acquire the tough loudspeaker structure of fully bearing an impact from the outside despite a light weight.

[Translation done.]

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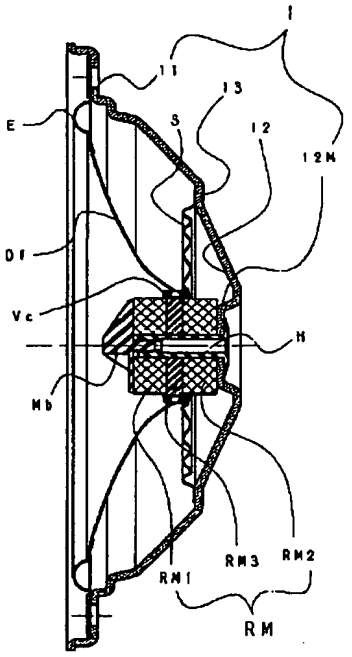
(54)【発明の名称】　スピーカ構造

(57)【要約】

【課題】　ネオジム反発型磁気回路のような、小型高性能な磁気回路を装着しても共振し難く、軽量化に適した形状のスピーカフレームを提供することにある。

【解決手段】反発型磁気回路型スピーカにおいて、スピーカフレームのダンパ座の内周部から磁気回路下端部の外周部までを断面において直線状に結んだ形状とした。



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【特許請求の範囲】

【請求項１】　磁性材からなるセンタープレート（ＲＭ３）を挟んで２つのマグネット（ＲＭ１）（ＲＭ２）を同極同志が対向するように配置して、該センタープレート（ＲＭ３）の外周に反発型磁界を形成する反発型磁気回路（ＲＭ）が構成されると共に該反発型磁界内にボイスコイルを配置してなる反発型磁気回路型スピーカにおいて、スピーカフレーム（１）のダンパ貼り代部であるダンパ座（１３）の内周部から磁気回路下端部の外周部までを断面において直線状に結んだ形状としたことを特徴とするスピーカ構造。

【請求項２】　磁性材からなるセンタープレート（ＲＭ３）を挟んで２つのマグネット（ＲＭ１）（ＲＭ２）を同極同志が対向するように配置して、該センタープレート（ＲＭ３）の外周に反発型磁界を形成する反発型磁気回路（ＲＭ）が構成されると共に該反発型磁界内にボイスコイルを配置してなる反発型磁気回路型スピーカにおいて、フレーム底部（１２）の反発型磁気回路を取り付ける部分を盛り上げて凸部（１２Ｍ）を設け、ダンパ座（１３）の内周側から前記凸部（１２Ｍ）の下端部までを断面において直線状に結び、該フレーム底部（１２）の断面をＷ字形状としたことを特徴とする請求項１記載のスピーカ構造。

【請求項３】　フレーム（１）のダンパ座（１３）より内側に任意のリブ（１２Ｌ）を設けてなることを特徴とする請求項１、又は２記載のスピーカの構造。

【請求項４】　前記反発型磁気回路（ＲＭ）を支持する棒状のマグネットホルダ（Ｈ）の端部にフランジ部（Ｈ１）を設け、該フランジ部（Ｈ１）をフレーム底部（１２）又は前記凸部（１２Ｍ）の裏面側に装着し、該フランジ部（Ｈ１）と前記反発型磁気回路（ＲＭ）のマグネット（ＲＭ２）によりフレーム１の底部（１２）又は前記凸部（１２Ｍ）を挟持してなることを特徴とする請求項１乃至３記載のスピーカの構造。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明はスピーカ構造に関するもので、特に軽量化を目的とした反発型磁気回路型スピーカの構造に関するものである。

【０００２】

【従来の技術】近時のスピーカ、特に車載用スピーカにおいては、軽量化が強く要請されている。車載用スピーカに限らず一般的なスピーカにおける重量のほとんどを占めるのが、スピーカ構成部品のフレーム及び磁気回路部である。例えば車載用スピーカとして最も多用されている６．５インチ口径のスピーカ重量を我々が提供しているスピーカの例で説明すると、スピーカ単体の重量は約６３０ｇで、各構成部品の内訳は、フレームが１３８ｇ、磁気回路部が約４８３ｇ、振動系部品３．２ｇ、その他が５．８ｇである。

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【０００３】前記のようなスピーカの軽量化を図る場合、図１４のようにスピーカ単体の重量の約７７％を占める磁気回路部の軽量化が最も有効であることは当然のことで、磁気性能がフェライトマグネットＭ１より遙かに高い、図１３のようなネオジムマグネット（ＲＭ１、ＲＭ２）を用いた反発型磁気回路ＲＭを使用した場合では、磁気回路が大幅に軽量化されるため、該磁気回路を支えるフレームが従来のフェライトマグネットを用いた磁気回路を支えるフレームより遙かに少ない強度で済む。

【０００４】つまり、磁気回路Ｍの軽量化を図ることにより、フレーム１の強度に余裕ができ、フレーム重量をより一層削減することが可能となり、軽量化には極めて効果的である。我々は重量が６５ｇのネオジム反発型磁気回路ＲＭ、及び０．７ｍｍのアルミニウム板をプレス加工してなる重量４０ｇのアルミフレーム１を用い、６．５インチ口径のスピーカで単体重量１３０ｇ以下の実用的なスピーカを提供している。

【０００５】現在の軽量化における主な手段として、やはり磁気回路Ｍの軽量化と共にフレームの軽量化が図られており、ネオジムマグネットＭ１は今後も高性能化が進んで、現状より更なる小型化が可能で軽量化に寄与することが予想されるところであるが、フレームの重量は現在広く一般的に用いられている金属製フレームや樹脂製フレームでは既に限界に近いところまできている。

【０００６】つまり、現状のフレーム、特に車載用スピーカのフレームはコスト、及び機能等の徹底追求で合理的形態を有しており、フレームの薄肉化等の手法で今以上のフレームの軽量化を行うと、フレーム強度が極端に不足し、フレーム共振が簡単に発生したり、車室内装着時に変形したりで、フレームの体をなさなくなる恐れがある。

【０００７】例えば、アルミフレーム１の場合、板厚０．７ｍｍのアルミフレーム１（約４０ｇ）でも通常一般的に用いる使用範囲内ではフレーム共振による音質劣化が顕著に現れることは無く、フレーム１としての必要強度を確保している。しかし、該板厚０．７ｍｍのアルミフレーム１は、同板厚０．７ｍｍの鉄板フレーム１に比較して強度が約１／２程度なので、該アルミフレーム１のスピーカを車室内に取り付ける際、ネジ締め作業において該スピーカの取付けフランジ部１１特に取付けネジ穴近傍を変形させる危険性が高い。

【０００８】従って、現状はフレーム１の板厚を０．７ｍｍから１ｍｍに増やすことでフランジ部のネジ締め変形を防いでいる。つまりフレーム１の全体強度を上げることでフランジ部の強度を増強しており、当然のことながら、フレーム１重量も増して約４０ｇから約６０ｇのフレーム重量となっている。

【０００９】軽量化を最優先することを考えると、フレーム１の板厚０．７ｍｍ（４０ｇ）のフレームフランジ

部１１が変形しなければよいのであって、例えば、取付フランジ部の裏面に任意の厚さを有した樹脂、或いは金属製等のリング状からなるスペーサ等を接着等の手段で装着し、フランジ部１１の補強を行うことが考えられる。

【００１０】但し、該スペーサの重量が２０g以上になるとフレーム１の板厚を０．７ｍｍから１ｍｍにした重量（６０ｇ）と同じになり軽量化の効果は薄れるので、スペーサ重量は２０ｇ以下であることが必須条件で、しかも可能な限り軽量でしかもネジ締め力に耐えられる強度を有した材質が要求されることとなる。この様にフランジ部１１の変形に対しては各種の対応策を必要とする。

【００１１】一方、フレーム１の共振を防ぐにはフレーム１強度を増す、或いは共振しにくい材質を選んでフレーム１を作製する等の方法しかない。つまりフレーム１共振の主たる要因が、磁気回路Ｍによる反発動作に起因するもので、該反発動作に耐えうる強度、例えばフレーム１肉厚を充分に厚く、或いは補強用リブを適切に配置する等の対応方法が一般的であるが、共振を防ぐ方法は重量が増す傾向となる。

【００１２】ところが、現在のネオジム反発型磁気回路ＲＭは図１５に示す様な、従来のフェライト磁石を用いた外磁型磁気回路Ｍ用のフレーム１に取り付けたもので、該フレーム１にフェライト外磁型磁気回路Ｍを装着した場合はフレーム１の共振が発生し難いが、ネオジム反発型磁気回路ＲＭを装着するとフレーム１の共振が発生し易くなり、フレーム１共振がフレーム底部１２における磁気回路装着部の平坦形状に起因することが判明した。

【００１３】以下、詳細を説明すると、ネオジム反発型磁気回路ＲＭ取り付け方法としては、図１１に示す様にフレーム底部１２に取り付けたホルダＨを介してフレーム１に装着されているが、同一フレーム１へのホルダＨ装着状態によってフレーム１共振が発生する場合と発生しない場合が見出され、共振が発生する場合はホルダＨをカシメ装着した場合で、共振が発生しない場合はホルダＨをネジ止め装着した場合においてであることが判明した。

【００１４】前記ホルダＨはアルミニウム製で、図１１、或いは図１２に示す様な断面形状で肉厚約１～２ｍｍ程の概ね円盤形状底部Ｈ１の中央にネオジム反発型磁気回路ＲＭのガイド用ボールＨ２部が一体で設けられている。図１１において、カシメ装着の例を記すと、図１５のように前記４０ｇのアルミフレーム１（板厚０．７ｍｍ）の底部１２の中央に設けてある穴１２Ｈにホルダ Ｈを装着するが、前記ホルダＨには図１１に示す様にホルダ底部のフランジ部Ｈ１の上面の所定位置、つまり前記穴１２Ｈに挿入可能な高さ１．５ｍｍ、幅１ｍｍ程のリング状の凸部Ｈ４が設けてある。

【００１５】該リング状凸部Ｈ４の外周部を穴１２Ｈ内周部に挿入し、更に図１１の局部拡大図に示す様に、該リング状凸部Ｈ４を上方から見て１６分割した位置を幅１ｍｍ程でプレス変形せしめ、該凸部Ｈ４を穴１２ＨにカシメることでホルダＨをフレーム１に装着している。装着後に、振動系部品であるボイスコイルＶｃ、振動板Ｄｆ、ダンパＳ及び、ネオジム反発型磁気回路ＲＭ等を装着しスピーカとして完成させる。

【００１６】図１２において、ホルダＨのネジ止め装着例を記すと、前記４０ｇのアルミフレーム１（板厚０．７ｍｍ）の底部１２に設けてある前記穴１２Ｈに９０度振り分けで４カ所設けられているフェライト外磁型磁気回路Ｍ取り付け用の穴１２ｈ（図１５参照）を介してネジｂにてホルダＨを装着するが、ホルダＨには前記カシメ装着用ホルダＨのリング状凸部Ｈ４の外側に厚さ約３ｍｍからなるフランジ部Ｈ１を設け、更に前記磁気回路Ｍ取り付け穴１２ｈに対応した位置に雌ネジ部を設けてある。

【００１７】このようなネジ止めの場合、前記リング状凸部Ｈ４は該ホルダＨ及びフレーム１との位置出し用ガイドとなり該凸部Ｈ４の外周部を穴１２Ｈ内周部に挿入し、更にフランジ部Ｈ１の雌ネジ穴をフレーム１の磁気回路Ｍ取り付け用の穴１２ｈに合わせ、４カ所をネジｂにて締結しホルダＨをフレーム１に装着せしめ、装着後に振動系部品であるボイスコイルＶｃ、振動板Ｄｆ、ダンパＳ及び、ネオジム反発型磁気回路ＲＭ等を装着しスピーカとして完成させる。

【００１８】ネオジム反発型磁気回路ＲＭの外径はフェライト外磁型磁気回路Ｍより遥かに小径である。従って、フレーム底部１２にネオジム反発型磁気回路ＲＭを配置する際、従来の穴１２Ｈの径よりも小さな径で済むため、結果的にフレーム底部１２の外周部よりネオジム反発型磁気回路ＲＭの外周部間に平坦部１２Ｆが発生し、該平坦部１２Ｆを該磁気回路Ｍにて加振することになるため共振しやすい構造となっていた。フレーム共振を起こすカシメ装着構造、及びフレーム共振を起こさないネジ止め構造の二事例を比較すると、カシメ装着構造が前記共振発生構造により近い構造である。

【００１９】ネジ止め構造の場合、雌ネジ穴を設けたフランジ部Ｈ１の肉厚寸法が大きいためフレーム底部１２、即ち平坦部１２Ｆを補強する形状となり、強度が大幅に増すため、共振を発生させ難い構造となる。

【００２０】ちなみに、図１４に示す様に前記４０ｇのアルミフレーム１に従来のフェライト外磁型磁気回路Ｍ（重量４８０ｇ）を装着したスピーカに入力信号を印加しても、フレーム共振は発生しない。又、図１３に示す様にフレーム底部１２に前記ホルダＨを設けず、穴１２Ｈが無い状態のフレーム１に直接ネオジム反発型磁気回路ＲＭを設けた場合、つまりフレーム底部１２の外周部よりネオジム反発型磁気回路ＲＭの外周部間の平坦部１

２Ｆ寸法が大きい状態においても同様にフレーム共振が発生することを確認した。

【００２１】従って、現在使用されているフレーム１はフェライト外磁型磁気回路Ｍに適した形状であって、ネオジム反発型磁気回路ＲＭのような、小型高性能な磁気回路を用いるにはフレーム底部１２における平坦部１２Ｆの厚みを増す、即ち重量増加の構造としなければならず、軽量化を目的としたネオジム反発型磁気回路ＲＭの効果が得られず、並びにフレーム１の軽量化にも適した形状でないことが判明した。

【００２２】

【発明が解決しようとする課題】本発明は上記従来例の欠点を解消し、ネオジム反発型磁気回路ＲＭのような、小型高性能な磁気回路を装着しても共振し難く、尚且つ軽量化に適した形状のフレーム１、及び該フレーム１形状に適したネオジム反発型磁気回路ＲＭの装着構造を提供するものである。

【００２３】

【課題を解決するための手段】上記課題を解決するために、従来のフェライト外磁型磁気回路Ｍを取りつける形状のフレーム１の様にダンパ座１３の内周側からフレーム底部１２に存在する平坦部１２Ｆをなくし、前記ダンパ座１３より内側から磁気回路Ｍ下端部の外周近傍までを、斜めにほぼ直線状に結んだ形状とし、必要に応じ、フレーム底部１２の反発型磁気回路ＲＭを取り付ける部分を盛り上げ、任意の凸形状を設け、ダンパ座１３より内側から前記凸部１２Ｍの下端部までを断面において直線状に結び、該フレーム底部１２の断面をＷ字形状になす様にした。

【００２４】又、ダンパＳの下面部におけるフレーム１強度が更に必要な場合は、ダンパ座１３より内側にリブ１２Ｌ構造を設ける構造とし、更にマグネットＭ１の装着部の強度を軽量で尚且つ安定して向上させるためにホルダＨの端部にフランジ部Ｈ１を設け、該フランジ部Ｈ１をフレーム底部１２の裏面側、若しくは前記凸部１２Ｍの裏面側に装着し、該フランジ部Ｈ１及び前記ネオジム反発型磁気回路ＲＭの下マグネットＲＭ２の底部にてフレーム１の装着部を挟持する構造とした。

【００２５】

【発明の実施の形態】本発明のスピーカ構造の実施例を図１～図１０にて説明するが従来例と共通部分は符号を同様に付してある。本発明のスピーカ用フレーム１を得るため、本実施例においては一般的な金属製フレーム１の成形金型が安価で、尚且つ金属製フレーム１より更に軽量となるカーボン繊維による強化プラスチック(以下、ＣＦＲＰと記す。）製のフレーム１を作製することにしたが、本実施例の形状及び構造は、軽量化を目的とした金属製フレーム１、例えば、アルミニウム、チタン等製のフレーム１にも応用で可能である。

【００２６】本実施例のフレームの原材料としてフィラメント数３０００本で扁平状態のカーボン繊維を、経糸、緯糸共に１インチ当たりの打ち込み本数を１３本にて平織りしたカーボン織布を得、更に該カーボン織布に、該織布の重量の約４０％に相当する重量のビニルエステル樹脂をコートし、該樹脂が一般的にＢステージと称されているプリプレグ状態のカーボン織布ＣＦを得た。

【００２７】該織布ＣＦを三枚重ね合わせたものをプレス金型Ｄ１、Ｄ２にて熱圧成形し、図２、及び図３に示す様なＣＦＲＰ製の成形品ＣＦＣを得た。成形条件を記すと、成形金型温度は１４０℃で、プレス圧力は１５トン(軸出力)、成形時間は３分間とした。更に該成形品ＣＦＣのフランジ部１１の外周部にある未成形で余分な部分を抜きプレス等にて切除し、図４に示すような反発型磁気回路ＲＭ装着専用のＣＦＲＰ製のフレーム１を作製した。

【００２８】該フレーム１の形状及び概略寸法を図１にて説明すると、最大外形寸法は取付け用フランジ部１１の外直径が１６０ｍｍである。該フランジ部１１は振動板エッジＥの装着部であり、内径寸法が１２７．９ｍｍで、該フランジ部の外周部には約５．８ｍｍの立ち上がり部が設けられている。該立ち上がり部のからの最大深さ寸法は４１．４ｍｍで、フランジ１１裏面から深さ２２．８ｍｍの位置に外直径８５．２ｍｍで幅５．９ｍｍのダンパ座１３を設けている。

【００２９】該ダンパ座１３の内周部より更に内側に向かって２１．７ｍｍ、深さ方向に９．２ｍｍの斜め下方の位置まで直線で結び、更に底部の中央部を上方向に４ｍｍ程凸状に盛り上げた形状とし、各直線の交点は半径０．２ｍｍ～２．４ｍｍの曲線で結び、ダンパ座１３より下方のフレーム底部１２の断面が概ねＷ字形状になっている。

【００３０】前記断面形状に成形することにより、ネオジム反発型磁気回路ＲＭが装着されるフレーム底部１２の共振が基本的に少ない形状となり、尚且つ成形が行いやすくなる。更に図４に示す様に該成形品のフランジ部１１に該フレーム１取付け用の穴や、フランジ部１１とダンパ座１３間にフレーム支柱部を構成するために、余分な部分を抜きプレスにて切除するトリミング工程を経てスピーカ用フレーム１が完成する。該ＣＦＲＰフレーム１の完成重量は約３２．３ｇであった。

【００３１】前記の如くフレーム底部１２の中央部が凸状に盛り上げた形状となっているので、該凸部１２Ｍの頂部が任意の径を有した平坦部を得ており、該平坦部がネオジム反発型磁気回路ＲＭ装着部となっている。本実施例の場合、前記トリミング工程において該平坦部の中心に直径６ｍｍのホルダＨの装着用穴１２Ｍｈを設けてあり、更に該穴１２Ｍｈに図１等に示す様なホルダＨを装着してある。ホルダＨはアルミニウム製のボール部Ｈ２が外径５．９８ｍｍ、内径３．６ｍｍ、長さ２１．５

ｍｍのパイプ形状で、該パイプの一方の端部に外径１５ｍｍ、厚さ１ｍｍのフランジ部Ｈ１を設け、他方の端部は径３ｍｍの有効ネジ部５ｍｍの雌ネジＨ３を設けている。

【００３２】本実施例における前記ホルダＨの装着方法はフランジ部１１にアクリル系の接着剤を塗布し、更に該ホルダＨのボール部Ｈ２を前記ホルダＨの装着用穴１２Ｍｈの裏面側より挿入し、尚且つ該フランジ部１１を磁気回路装着部１２Ｍの裏面側に圧着し、該圧着状態を接着剤が硬化し所定の強度を発揮するまで維持し、ホルダＨのフランジＨ１部を磁気回路装着部１２Ｍの裏面側に接着するが、本実施例においては下記の様に行った。

【００３３】以下、図５乃至図７にて説明すると、真ちゅう製で内径６ｍｍ、外径２５．３８ｍｍ、長さ２１ｍｍの円柱に孔を設けた形状のボイスコイル位置出し治具Ｊをホルダボール部Ｈ２に挿入した後、ホルダＨ頂部には前記の如く雌ネジＨ３を設けてあるのでネジｂにて締め付けると、治具Ｊの底部、及びホルダＨのフランジＨ１部がフレーム１の磁気回路装着部１２Ｍを挟持し、尚且つ接着剤を塗布したホルダフランジＨ１面を磁気回路装着部１２Ｍの裏面に極めて強力に圧着せしめることになる。

【００３４】更に、図６に示す様に治具Ｊをホルダ Ｈと共に磁気回路装着部１２Ｍに装着した状態で、ボイスコイルＶｃ、ダンパＳ、振動板Ｄｆ等の振動系部品を装着するが、装着方法は従来の一般的スピーカと同様で接着によるものである。装着時に使用した接着剤が所期の強度に達した時点で、図７に示す様にホルダＨ頂部に締結していたネジｂを外し、前記ボイスコイル位置出し治具をホルダＨより抜き取ると、振動系部品及びホルダフランジＨ１部が、ボイスコイルＶｃ内径を基準として接着固定されているので、ホルダボール部Ｈ２の外径と及びボイスコイルＶｃの内径とが所定の位置を保持した装着状態となる。

【００３５】更に、該状態のホルダＨ、及び振動系部品であるボイスコイルＶｃ、振動板Ｄｆ、ダンパＳ付きフレーム１にネオジム反発型磁気回路ＲＭを装着するが、本実施例に用いたネオジムマグネットＲＭ１、 ＲＭ２は外径２５ｍｍ、内径６．１ｍｍ、厚さ８ｍｍで、該マグネットＲＭ１、 ＲＭ２の同極同士を向かい合わせて挟持するセンタープレートＲＭ３は、外径２５ｍｍ、内径６．０２ｍｍ、厚さ４ｍｍの軟鉄製で亜鉛メッキ処理を施してあり、該ネオジム反発型磁気回路ＲＭの完成重量は約６９．４ｇである。

【００３６】図７に示す様に前記ホルダＨ、及び振動系部品であるボイスコイルＶｃ、振動板Ｄｆ、ダンパＳ付きフレーム１のホルダボール部Ｈ２に上記ネオジム反発型磁気回路ＲＭの内径部を挿入すると、該磁気回路ＲＭのセンタプレートＲＭ３の外径、及びボイスコイルＶｃの内径に所定のクリアランスが設定されて該ネオジム反発型磁気回路ＲＭが設置される。該磁気回路ＲＭの設置後、更に図７に示す様に磁気回路固定ネジＭｂをホルダボールＨ２に設けた雌ネジＨ３に取り付け締め付けると、該ネオジム反発型磁気回路ＲＭの下マグネットＲＭ２の底部、及びホルダＨのフランジＨ１部がフレーム１の磁気回路装着部１２Ｍを極めて強力に挟持し、尚且つ該ネオジム反発型磁気回路ＲＭを固定せしめスピーカとして完成する。

【００３７】該スピーカの完成重量は約１２２ｇで、周波数特性を測定したところ従来のスピーカと同等以上の特性を示し、フレーム１に起因する問題点、特に共振による音質劣化等の問題点は見出せなかった。更に該スピーカの取付けフランジの強度も充分であり、各種装着実験においてネジｂ締めによる変形はほとんど認められず、実用範囲では全く問題無いことを確認した。

【００３８】

【実施例】本実施例の場合、スピーカ仕様を満たす目的で前記の如くフレーム底部１２の中央部を４ｍｍ程凸状に盛り上げ、フレーム底部１２の断面が概ねＷ字形状をしたが、スピーカの仕様が異なる場合、例えば、振動板の振幅が少なくて良い場合、或いは、軽量化を若干犠牲にしても磁気回路Ｍ装着部の強度を増したい場合などは、図９、及び図１０の様な凸部を設けない形状となっても良いし、更に強度を増すためにダンパ座１３内周部から磁気回路底部までの間に図８の様なリブ１２Ｌを一体成型で設けることもできる。

【００３９】

【発明の効果】本発明の様なフレーム形状にすることにより、ダンパ座１３内周部からネオジム反発型磁気回路装着部１２Ｍ間を共振し難い曲面で構成することになり、従来のフレーム底部１２の様に共振し易い平坦部１２Ｆを殆ど無くすことが可能となる。従って、フレーム１の形状が外径寸法の小さなネオジム反発型磁気回路ＲＭの形状に適合し、軽量で尚且つ共振し難いネオジム反発型磁気回路ＲＭを有したスピーカを得ることが可能となった。

【００４０】又、該フレーム１形状はダンパ座１３以下の形状が、従来のフレーム１の様にダンパ座１３内周部からの立下がり部が無く、緩い傾斜形状を有しているためフレーム１の成形性がより良い方向に改善され生産性が向上する効果を有する。

【００４１】更に、従来のフェライト外磁型磁気回路Ｍを有するフレーム１では不可能な、ダンパＳの下面部にリブ１２Ｌ構造を設けるフレーム１構造が可能であるので、更なるフレーム１強度の向上が容易に計ることが可能である。

【００４２】又、ホルダＨの端部にフランジＨ１部を設け、該フランジＨ１部をフレーム底部１２の裏面側に装着し、該フランジＨ１部及びネオジム反発型磁気回路ＲＭの下マグネットＲＭ２の底部にてフレーム１の磁気回

路装着部１２Ｍを挟持する構造としたことで、図１３に示す様な従来一般的な反発型磁気回路ＲＭの取付方法の様に、薄板金属製フレーム１に雌ネジ部を設ける為のバーリング加工等が不要となり、しかもバーリング加工が不可能なＣＦＲＰ製フレーム等にも容易に反発型磁気回路装着ＲＭが可能となる利点を有する。

【００４３】又、フランジ部にて磁気回路装着部１２Ｍを挟持することにより、該装着部１２Ｍにおける実質的な板厚が増すため該装着部１２Ｍの強度を大幅に向上せしめ、軽量ながらも外部からの衝撃に十分に耐える強靭なスピーカ構造を得ることが可能となる。

【図面の簡単な説明】

【図１】　本発明のスピーカ構造の実施例を示す反発型磁気回路スピーカの断面図。

【図２】　ＣＦＲＰ製のフレームの成形金型を示す断面図。

【図３】　フレームが熱圧成形された状態を示す断面図。

【図４】　フレームのトリミング加工前と完成状態を示す斜視図。

【図５】　フレームにホルダを装着する状態を示す断面図。

【図６】　フレームに振動系を装着した状態を示す断面図。

【図７】　フレームに反発型磁気回路を装着する状態を示す断面図。

【図８】　フレームにリブを設けた状態を示す斜視図。

【図９】　本発明の他の実施例を示す断面図。

【図１０】　本発明の他の実施例を示す断面図。

【図１１】　金属製フレームにホルダをカシメ装着しネオジム反発型磁気回路装着した従来のスピーカを示す断面図、及び局部拡大斜視図。

【図１２】　金属製フレームにホルダをネジ止め装着しネオジム反発型磁気回路装着した従来のスピーカを示す断面図。

【図１３】　金属製フレームに、ネジにてネオジム反発型磁気回路装着した従来のスピーカを示す断面図。

【図１４】　金属製フレームに外磁型磁気回路をカシメ

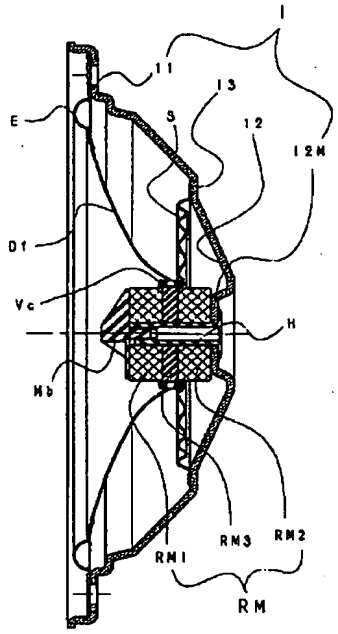
装着した従来のスピーカを示す断面図。

【図１５】　従来の金属製フレームを示す斜視図。

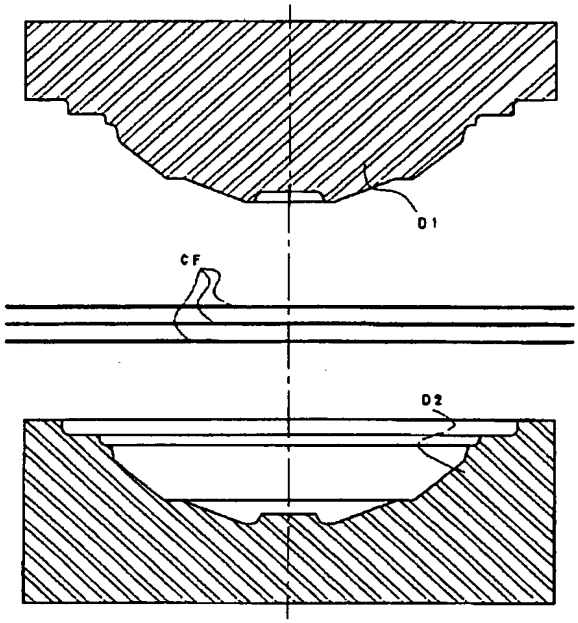
【符号の説明】

１	フレーム
１１	フランジ部
１２	フレーム底部
１２Ｆ	平坦部
１２Ｈ	穴
１２ｈ	穴
１２Ｌ	リブ
１２Ｍ	反発型磁気回路装着部
１２Ｍｈ	ホルダ装着用穴
１３	ダンパ座
ＣＦ	カーボン織布
ＣＦＣ	ＣＦＲＰ成型品
Ｄ１	金型
Ｄ２	金型
Ｅ	エッジ
Ｄｆ	振動板
Ｈ	ホルダ
Ｈ１	フランジ部
Ｈ２	ボール
Ｈ３	雌ネジ
Ｈ４	リング状凸部
Ｊ	位置出し冶具
Ｍ	外磁型磁気回路
Ｍ１	マグネット
Ｍ２	ヨーク
Ｍ３	プレート
Ｍ３ｄ	ダボ
Ｍｂ	磁気回路固定ネジ
ＲＭ	反発磁気回路
ＲＭ１	上マグネット
ＲＭ２	下マグネット
ＲＭ３	プレート
Ｓ	ダンパ
Ｖｃ	ボイスコイル
ｂ	ビス

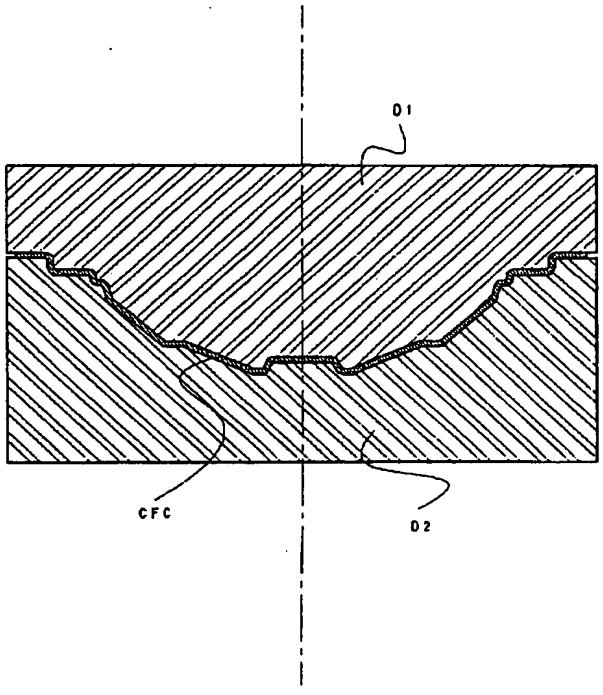
【図１】


1
11
13
S
12
12M
E
D1
Vc
H
Hb
RM1
RM3
RM2
RM

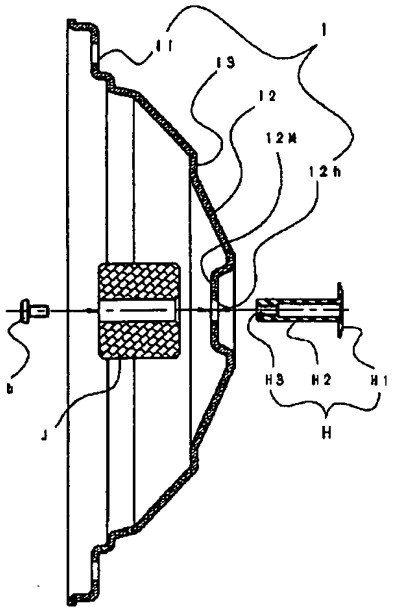
【図２】


D1
CF
D2

【図３】


D1
CFC
D2

【図５】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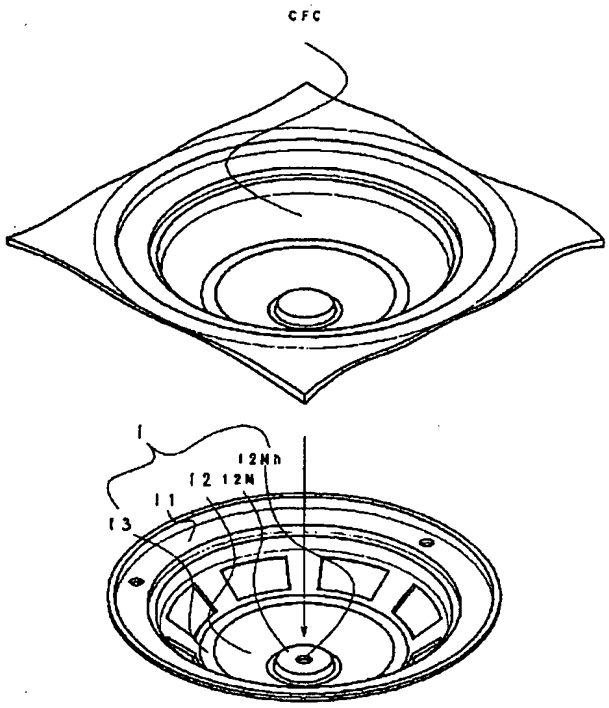
11
13
12
12M
12h
b
J
H3
H2
H1
H

【図４】


CFC
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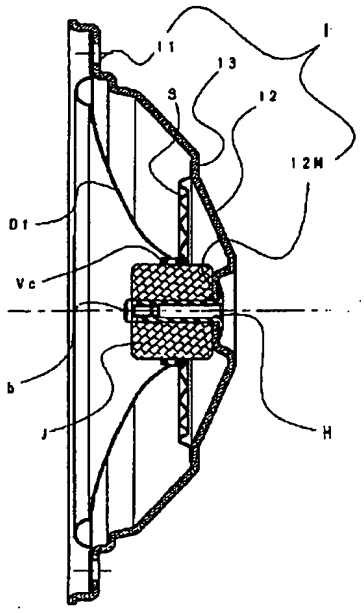
12 12M
11
13

【図６】


I
11
13
S
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12M
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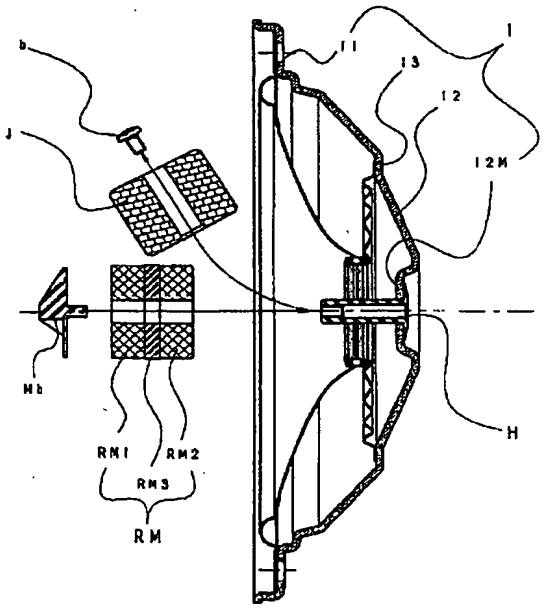
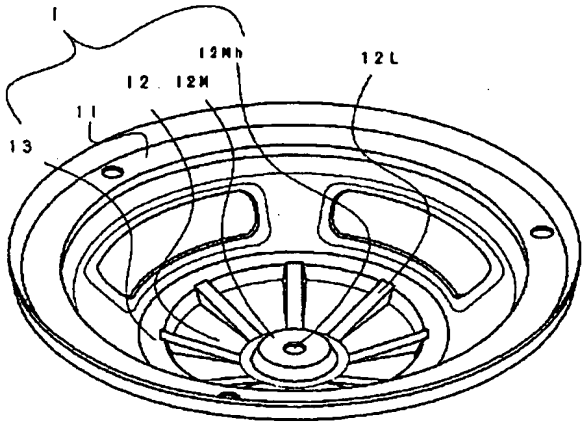
Vc
b
J
H

【図７】


b
J
Hb
I
11
13
12
12M
H
RM1
RM2
RM3
RM

【図８】


I
12Mh
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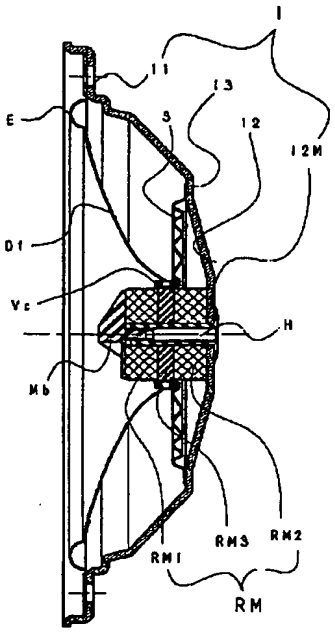
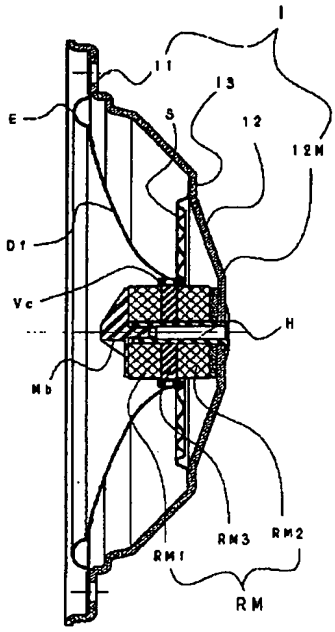
11
13

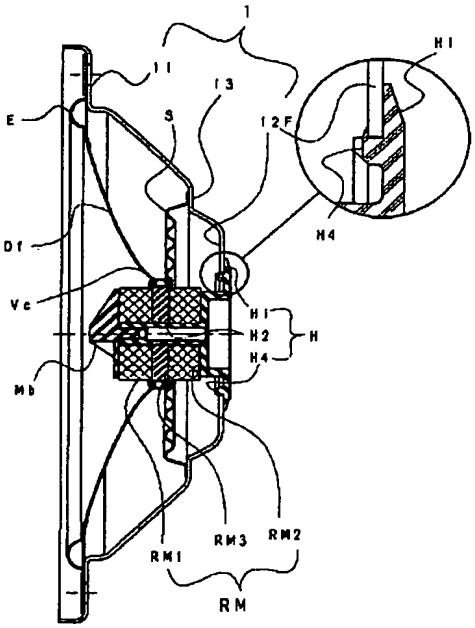
【図９】



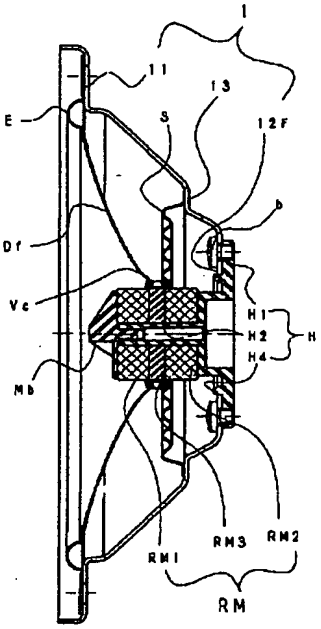
【図１０】



【図１１】



【図１２】



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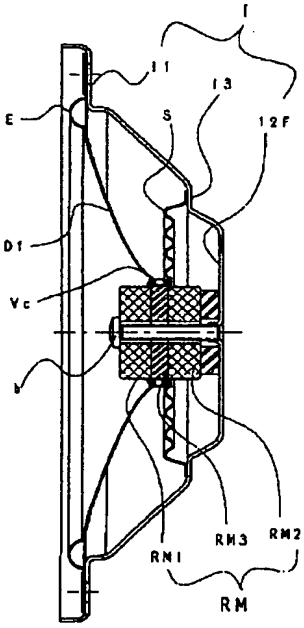

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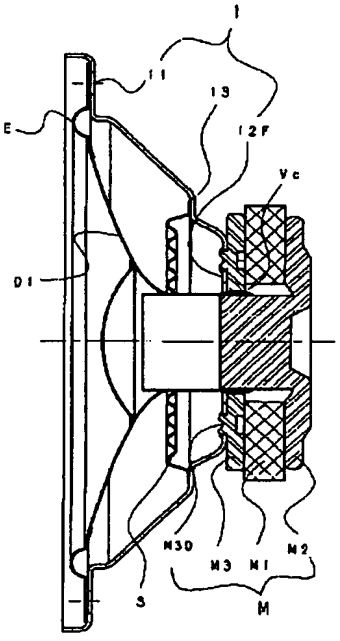

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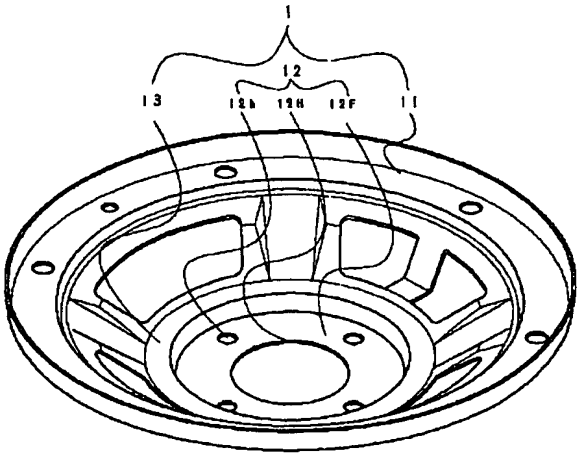

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